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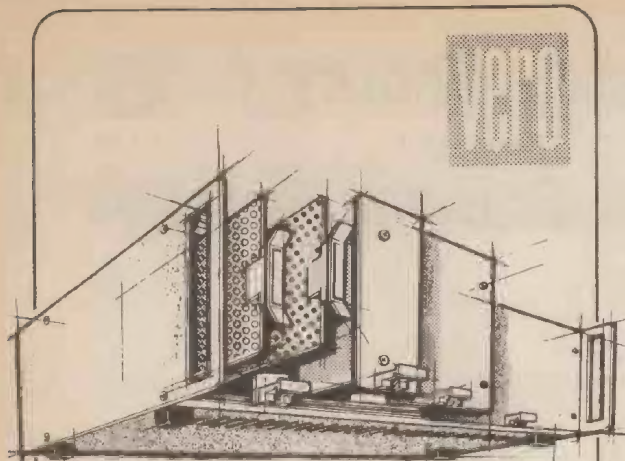


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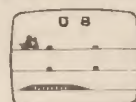
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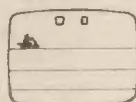
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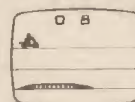
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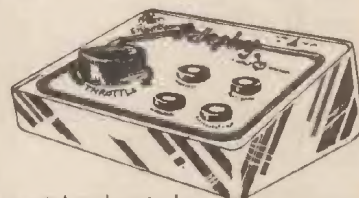


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# teleplay **STUNT**





IT'S THE LATEST!



# CYCLE

By C. Cary

ONE of the very latest TV games, Stunt Cycle is really four games in one. It is for one player and will provide endless fun. It offers a challenge to the individual's reaction and skill without any dependency upon a co-player as required in many other TV games.

Stunt Cycle is based on the microcircuit chip AY-3-8760—one of the latest second-generation designs from the leaders in this field, General Instrument Micro-electrics Limited.

This article describes a complete unit based on this chip which can be assembled in a small plastic case. A 9V d.c. supply is required. A suitable design for a mains operated unit is included elsewhere in this issue. Alternatively, a readily available commercial mains adapter can be used.

## THE CONTROLS

Connection is made to the television receiver at the aerial socket. The output from the Stunt Cycle is on the Channel 36 frequency. This has been chosen because it is not used in Europe by broadcasters.

Four pushbuttons are provided for game selection. An easy or amateur mode of play, or a hard or professional mode of play can be selected by a toggle switch.

The game is played using the Throttle Control. Authentic motorcycle noises are reproduced over the television speaker, varying as the "throttle" is adjusted. Other sound effects indicate hits, crashes and successful jumps. The score is displayed near the top of the screen.

## GAME DESCRIPTION

At the start of each game, the motorcycle and rider are stationary at the upper left-hand side of the TV screen. As the player turns the throttle, the motorcycle and rider move across the screen on track 1.

The motorcycle sound starts with the movement and as the cycle and rider accelerate, the motorcycle sound reflects these speed changes. The motorcycle wheels have an appearance of rotating at a speed also related to throttle setting.

At the end of track one, the cycle and rider reappear on track 2, at the left-hand side, and likewise at the end of track 2 the cycle appears on track 3 at the left-hand side of the screen.

The movement of the cycle and rider on track 3 to the right edge of the screen will cause a reinitialisation of the cycle and rider at the left of the screen on track 1. There will be no movement until the throttle is reset to a slow speed and then increased.

The four games are now described.

## STUNT CYCLE

The basic game is Stunt Cycle. The object of this game is to control the throttle speed so as to jump properly the ramp and buses located on track 3. The game begins with 8 buses. With each successful jump over the ramp and buses, an additional bus appears.

The game is over when the maximum number of errors has been exceeded, which is 3 or 7 errors depending on the position of the



STUNT CYCLE



DRAG RACE



SUPER STUNT CYCLE



MOTOCROSS

◀Norman Barrow in action at ITV MotoCross—photographer Nick Nicholls



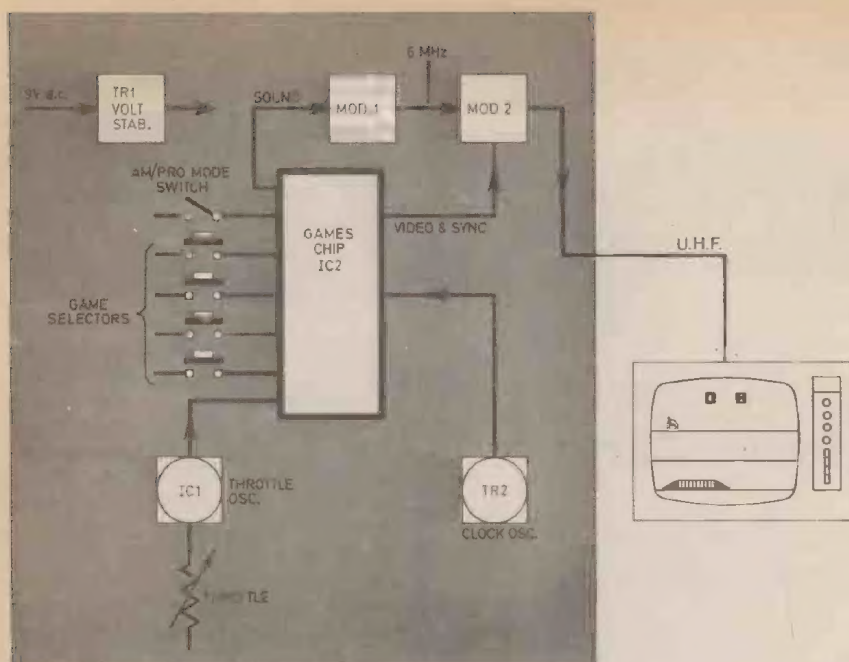


Fig. 1. Block diagram of the EE Teleplay Stunt Cycle Game.

AM/PRO switch or when 36 buses have been jumped, in which case the screen will fill up with buses. The game is then started by pressing the Stunt Cycle game button.

Errors are caused by accelerating too rapidly, insufficient speed to clear the buses, or landing too far past the back ramp after the jump. The cycle and rider flip upside down and a screeching sound indicates an error. The score records the errors in the first digit and the number of displayed buses in the next two digits.

### DRAG RACE

The object of Drag Race is to reach the end of track 3 in the shortest time. The three-digit score is automatically reset as the rider first begins to move on track 1 and the score is incremented until the game is over. The score appears centred on the screen above track 1, and the score remains until the start of the next game.

Drag Race requires a speed shifting to achieve the lowest time scores. As the throttle speed is increased and the rider begins to

move, the cycle object is in speed one and moves at a set rate across the screen.

The only way to accelerate the cycle object motion is to return the throttle to a "slow" position and then turn to a "fast" position. This shifting procedure will move the cycle into speed 2 and the object will go across the screen at a faster rate. Another "shift" will allow speed 3.

The AM/PRO option switch provides a difficulty factor. In the hard mode, a crash occurs if the player tries to increase the throttle speed too rapidly. A crash will flip the cycle and rider upside down and the sound will be a high-pitch screech. At the end of the crash, the cycle and rider are reinitialised on track 1 and the score reset. In the easy mode, no crash is allowed.



### SUPER STUNT CYCLE

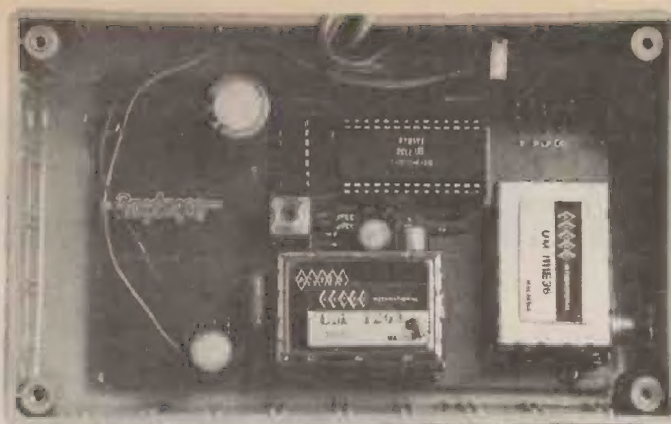
The third game is similar to Stunt Cycle with the addition of obstacles on track 1 and track 2. The object of Super Stunt Cycle is to do a "wheelie" over each obstacle and then adjust the throttle for the correct speed to jump the buses on the track 3.

The AM/PRO option switch selects one obstacle per track and allows 7 errors per game in the easy mode, and 2 obstacles per track and 3 errors per game in the hard mode.

Errors are caused by accelerating too rapidly, not in wheelie position over the obstacles, insufficient speed to clear the buses, or landing too far past the back ramp after the jump. The score records the number of errors and the number of buses displayed the same as in the game of Stunt Cycle.







The completed p.c.b. assembly.

## COMPONENTS

### Resistors

R1 15k $\Omega$	R10 2.2k $\Omega$
R2 100k $\Omega$	R11 2.2k $\Omega$
R3 100 $\Omega$	R12 2.2k $\Omega$
R4 1k $\Omega$	R13 220k $\Omega$
R5 1k $\Omega$	R14 1k $\Omega$
R6 100 $\Omega$	R15 1k $\Omega$
R7 100 $\Omega$	R16 2.2k $\Omega$
R8 220k $\Omega$	R17 2.2k $\Omega$
R9 2.2k $\Omega$	R18 470 $\Omega$

All resistors are carbon  $\frac{1}{4}$ W  $\pm$  5%

### Potentiometer

VR1 10k $\Omega$  lin. carbon

### Capacitors

- C1 220 $\mu$ F single-ended elect. 10V
- C2 100pF ceramic plate
- C3 33pF ceramic plate
- C4 820pF ceramic plate
- C5 33pF ceramic plate
- C6 220 $\mu$ F single-ended elect. 10V
- C7 0.18 $\mu$ F met. polyester film, 20%
- C8 100pF ceramic plate
- C9 100 $\mu$ F single-ended elect. 6V

### Semiconductors

- IC1 CD4069 CMOS hex inverter
- IC2 AY-3-8760-1
- TR1 BC182 *n*p*n* silicon
- TR2 BC182 *n*p*n* silicon
- D1 BZY88C Zener diode 8.2V 400mW

### Miscellaneous

- L1 100 $\mu$ H tunable choke in can (Weyrad)
- SK1 miniature jack socket
- SK2 part of MOD1
- SK3 part of MOD2
- S1 Miniature s.p.s.t. toggle switch
- S2-5 pushbutton switch (4 off)
- MOD1 Sound modulator UM1263 (Astec)
- MOD2 Vision modulator UM1111E36 (Astec)

Printed circuit board, (Teleplay, 14 Station Road, New Barnet, Herts.); i.c. sockets: 28-way (1 off), 14-way (1 off); 5in length 10-way ribbon cable; length Systoflex 1mm sleeving; knob; aerial connecting lead; plastic case (Bimbox No. 1005); panel; mains adaptor unit 9V 100mA output. Screws: 6BA  $\times$   $\frac{3}{16}$ in (4 off); Self-tapping No. 4  $\times$   $\frac{1}{4}$ in. (2 off).

See  
**Shop  
Talk**  
page 433

## MOTOCROSS

The object of Motocross is to traverse the three tracks in the shortest time, doing a wheelie over each obstacle. The score counters record the run time in the same manner as the Drag game.

As the throttle is increased, the cycle and rider move across track 1, at a rate determined by the throttle control setting. Motocross has no speed shifting. Located on each of the three tracks are obstacles. The AM/PRO option switch selects the number of obstacles per track. The easy mode has one obstacle per track and the hard has two obstacles per track.

In Motocross, the crash is not caused by accelerating too rapidly. The crash is caused by not doing a wheelie over the obstacle. In the wheelie position, the cycle will have the front wheel lifted off the track. A crash into an obstacle will flip the cycle upside down and produce the screech sound. The score is reset at the end of the crash.

**START  
HERE FOR  
CONSTRUCTION**

## IMPORTANT

The Games Chip and the hex inverter chip are normally supplied mounted on a piece of foam polystyrene and wrapped in metal foil. This protects these devices from mechanical and electrostatic damage. Do not remove or handle these components until ready to fit into sockets (see later).

## PRINTED CIRCUIT BOARD

The main assembly is built on a p.c.b. A full-size drawing of this is given in Fig. 4. The overall dimensions of this board should not be exceeded if the suggested plastic case is to be used.

Mount and carefully solder into their correct positions all circuit components. It is advisable to double check components and locations before soldering. The following sequence of operations is suggested.



# teleplay

## STUNT

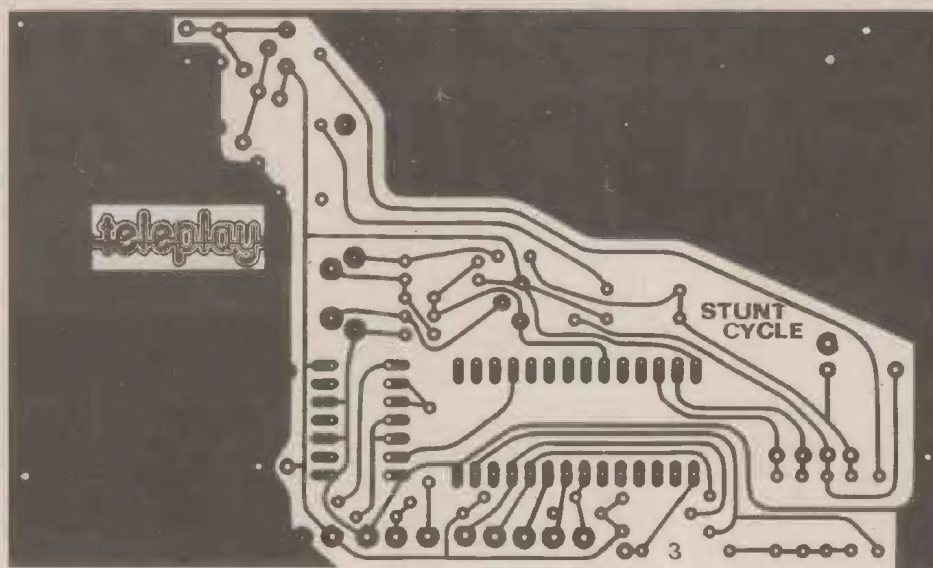


Fig. 4. Full size diagram of the Stunt Cycle printed circuit board (copyright).

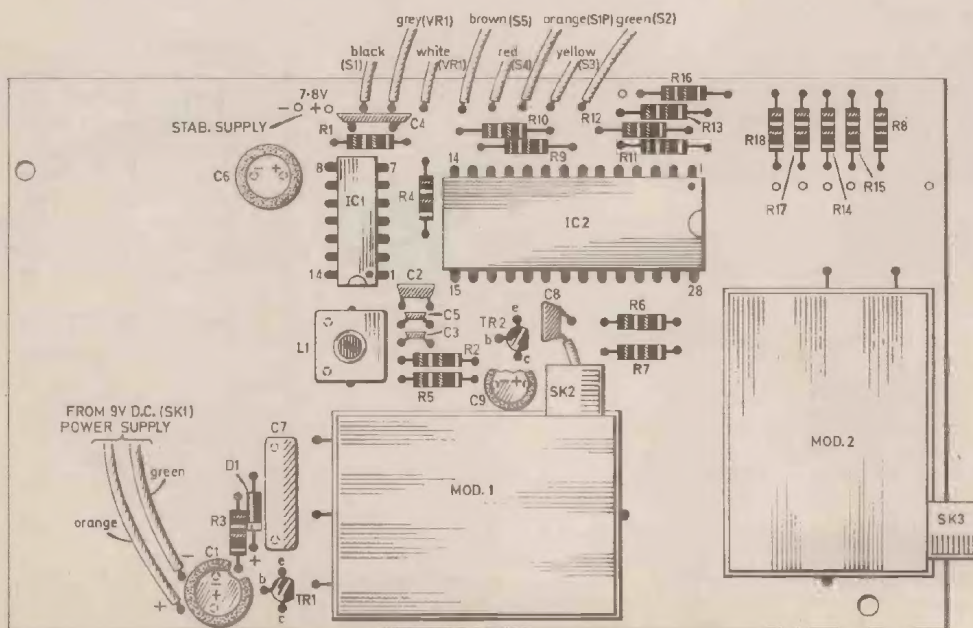


Fig. 5. Top view of the p.c.b. showing location of components and flying leads to front panel and Jack socket.



IT'S THE LATEST!

# CYCLE

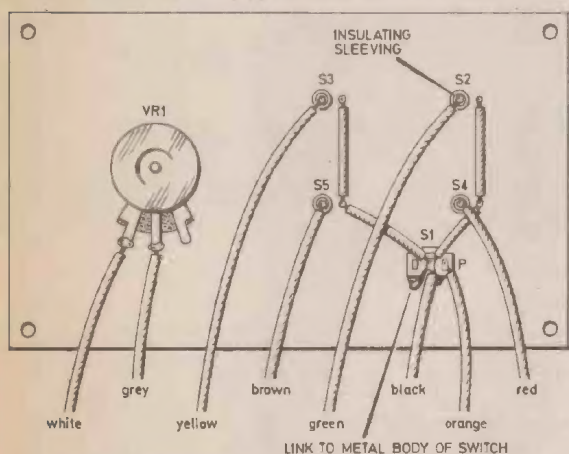


Fig. 6. Front Panel wiring. Note that one pin of each push-button switch is fitted with an insulating sleeve.

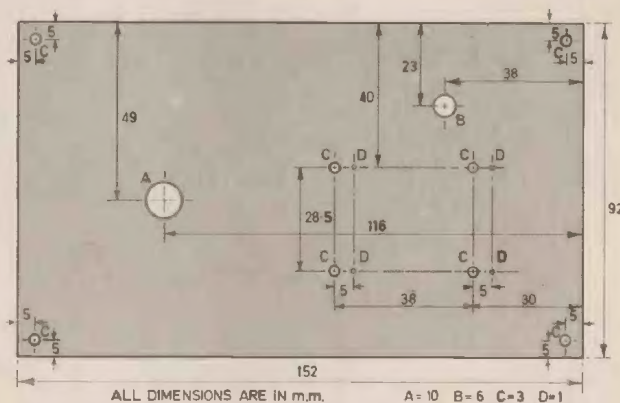


Fig. 7. Front Panel drilling details.



View of the completed p.c.b. assembly and front panel.

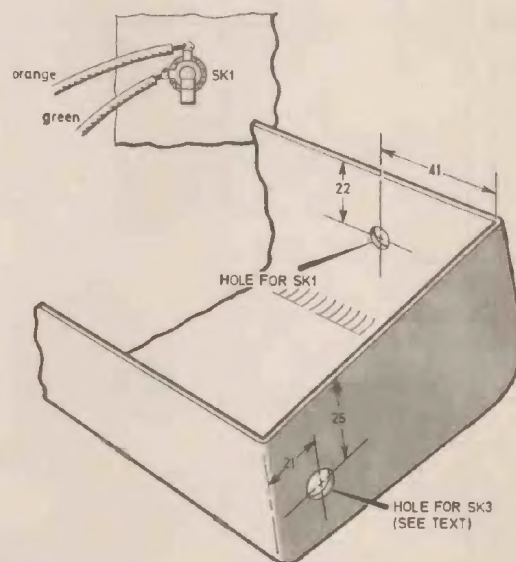


Fig. 8. Case drilling details. Locate p.c.b. assembly and check alignment of output socket SK2 before drilling hole for aerial lead connector.



## CIRCUIT DESCRIPTION

The block diagram Fig. 1 shows in simplified form the overall system.

The heart (or perhaps rather, the brain) of this project is the G I Cycle Games chip AY-3-8760. This 28-lead dual-in-line microcircuit is IC2. It is a highly complex device, and contains a multiplicity of circuitry used to generate, modify and process logic signals for the operation of this game; it receives input signals from external sources, i.e. throttle control, clock generator; and it provides output for feeding to the TV receiver (via the modulators).

Other major items are the two ready-assembled modulator units MOD 1 and MOD 2. One digital i.c. and a pair of transistors complete the list of active components involved in this project.

For the following more detailed description, reference should be made to the circuit diagram Fig. 2.

### POWER SUPPLY

An external 9V d.c. supply is fed in via jack SK1 and applied to the voltage stabiliser TR1. This *npn* transistor is employed as an emitter follower. The base of TR1 is held at 8.2V by R3 and the Zener diode D1. The output at the emitter is about 7.8V. This supply is smoothed and filtered by C6 and

C7 respectively; it is then fed to IC1 (pin 14), IC2 (pin 28), TR2 (collector); and via dropping resistor R6 to MOD 2, and via R6, R7 to MOD 1.

The 7.8V line is also fed via resistors R9-R13 to pins 7, 8, 10, 11 of IC2 for game selection.

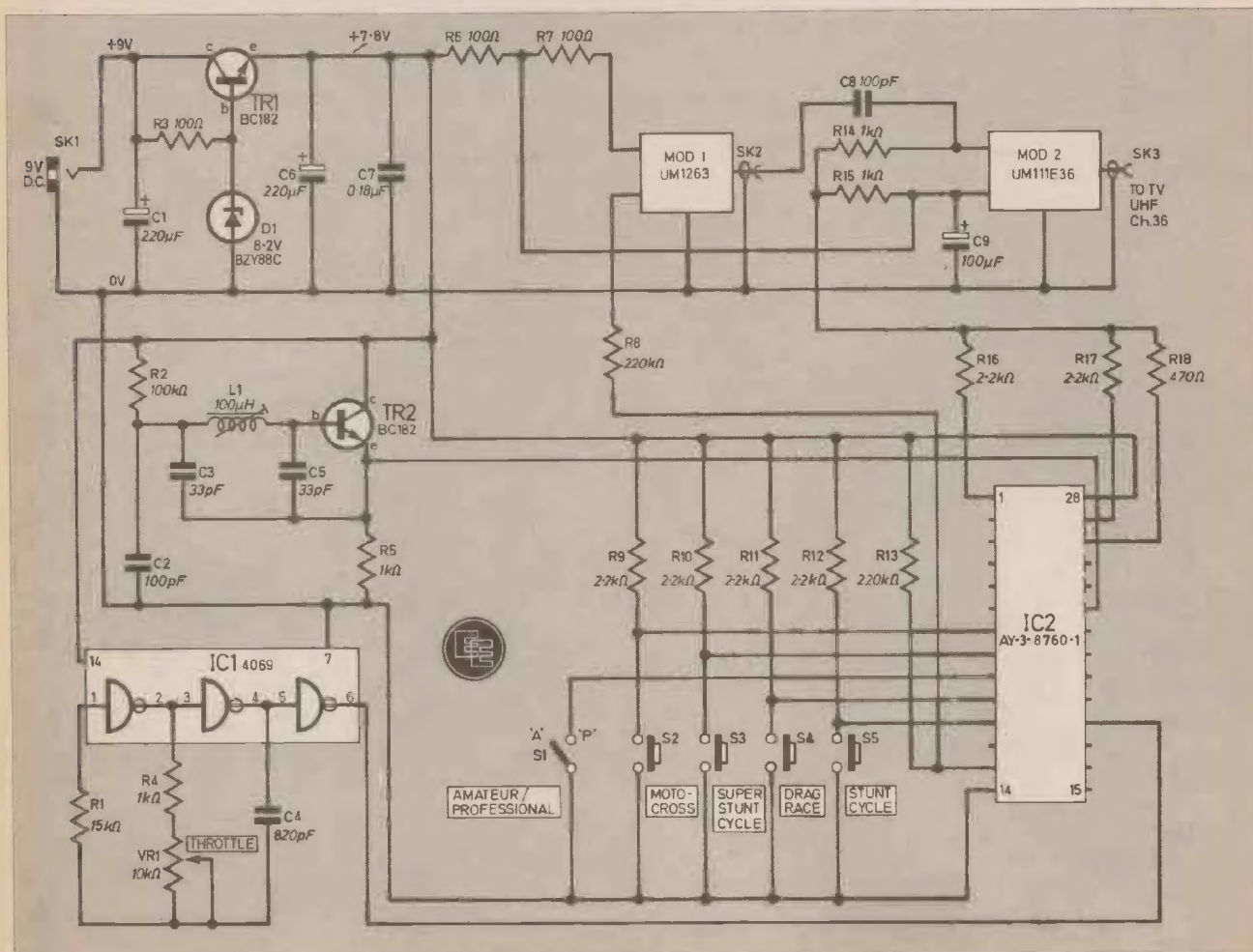
The negative (0V) line is taken to IC1 (pin 7), to IC2 (pin 14) and to one side of each of the five switches. MOD 1 and MOD 2 are both automatically connected to the 0V line via their metal screening boxes.

The total loading on the power supply is 75mA approximately.

### CONTROL OSCILLATOR

Two stages of the hex inverter IC1 are used in association with

Fig. 2. Circuit diagram of the Stunt Cycle game.





R1, R4, VR1 and C4 to form a square wave oscillator. This is tunable over the range 50-250kHz by VR1, the Throttle Control. The third inverter is a buffer stage and the oscillator output is fed to IC2, pin 18. (The remaining three inverter stages of the 4069 chip are not used).

## CLOCK OSCILLATOR

Transistor TR2 together with associated resistors and capacitors and L1 form an oscillator operating at 3.58MHz. The output is applied to pin 23 of IC2. Fine tuning is possible by adjusting the core of L1.

This clock oscillator provides the timing pulses which control and synchronise all the processes initiated within the games chip IC2.

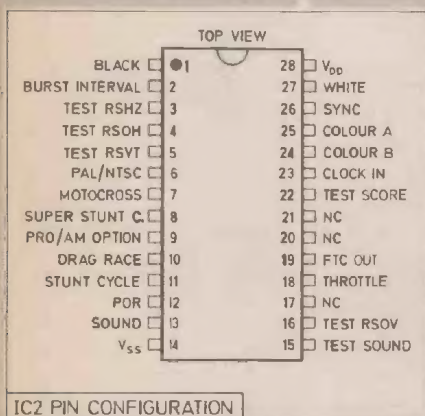


Fig. 3. Pin identification for the Stunt Cycle microcircuit chip AY-3-8760. Connections to be made in accordance with Circuit Diagram (Fig. 2) and Fig. 4 and Fig. 5. Unused pins must be ignored and NOT be used as anchoring points.

## SOUND EFFECTS

Sound effects for the motorcycle engine, bus hit, crash screech, and a "good jump" indicator are generated within IC2. This audio output appears at pin 13 and is taken to the audio modulator MOD 1, via R8.

## AUDIO MODULATOR

MOD 1 is an f.m. audio adapter unit. The audio input is used to modulate a 6MHz carrier generated within MOD 1. This r.f. output is applied to the input of the u.h.f. modulator MOD 2, via C8.

## SYNC AND VIDEO SIGNALS

IC2 provides the horizontal sync and vertical flyback signals for the TV receiver. These signals appear as a combined output at pin 26, whence they are d.c. coupled to MOD 2 via R18.

IC2 also provides the video signal of ramps, tracks and the composite blanking. This output appears at pin 1, and is d.c. coupled to MOD 2 via R16.

The video output signal for the motorcycle, buses, score and obstacles appears at pin 27. This is d.c. coupled to MOD 2 via R17.

## GAME SELECTION

Selection of the four individual games is made by pushbutton switches S2-S5. When one of these is pressed, pin 7, 8, 10 and 11 of IC2 is momentarily connected to negative supply line. This causes the appropriate circuits for this game to be actuated within IC2.

## MODE SELECTION

When pin 9 of IC2 is connected to negative line by S1 the "Professional" mode of play is actuated within the chip. When S1 is open the "Amateur" mode is actuated.

## PAL/NTSC

For European PAL standards (312 vertical lines) pin 6 of IC2 is left unconnected. If this pin is connected to negative supply line the chip is adjusted for the American NTSC standard (262 vertical lines).

## UHF VISION MODULATOR

The u.h.f. vision modulator unit MOD 2 receives the sync and video signals from the games chip IC2; also the r.f. frequency-modulated carrier from the audio modulator MOD 1, via C8. The u.h.f. carrier generated within MOD 2 is modulated by these inputs. The carrier is pretuned to the European Channel 36 (591.5MHz) and is made available at phono socket SK2 for feeding to the aerial input of a television receiver.



Photograph of the finished unit showing layout of front panel controls.

1. Mount resistors. Ensure that R9 and R11 do not encroach on area to be occupied by IC2 socket.

2. Mount transistors.

3. Mount capacitors. Ensure correct polarity for electrolytics C1, C6 and C9.

C8 should be left until modulator MOD 1 is mounted. The top of MOD 1 must be removed to make the connection point on SK2 accessible. Fit 1/2in of sleeving to one lead of C8; insert this lead into socket of MOD 1, bend end of lead and solder to rear end of SK2 spigot. Replace top and mount MOD 1 onto p.c.b., feeding the three input leads through the appropriate holes. Bend slightly these leads and the two anchoring tags before soldering to the p.c.b. Manipulate C8 carefully to pass its free lead through correct hole in board.

4. Mount sockets for IC1 and IC2. IMPORTANT: Unused pins on IC2 socket must NOT be used as connection points.

5. Mount L1, bending can fixing tags to make secure before soldering.

6. Mount MOD 2.

## INTERCONNECTING LEADS

Prepare 8 leads, about 5 inches in length and solder to the holes along the edge of the p.c.b. It is suggested that different coloured leads be used to simplify identification. (If ribbon cable is used, the colours will correspond to those given in Fig. 5.)

Wire a pair of leads (5 or 6 inches in length to points - and +, (adjacent to C1). Connect miniature jack socket SK1 to other end.

Fit the games chip into its socket. Ensure correct orientation of i.c. (see key diagram, Fig. 3).



Carefully align the pins directly over the sockets then apply firm and even pressure to seat the i.c. fully in the socket.

The hex inverter chip IC1 should be handled and fitted in the same manner.

## DRILLING OF CASE

Place completed p.c.b. inside case, locating corner holes precisely over screw bushes in bottom of case. Mark side of case for exact alignment with centre of SK2 on MOD 2. Drill case accordingly, also for jack socket. Hole dimensions are given in Fig. 8.

Fit p.c.b. into case and secure with two screws at opposite corners of the board. Fit the jack socket to the case.

## FRONT PANEL

Drill front panel as shown in Fig. 7. Apply small dab of glue to the base of each pushbutton switch then fit firmly in position. Fit a 3/16in length of Systoflex over the pin on each switch that passes through the larger panel hole.

Fit the potentiometer and the toggle switch S1. Wire up all these components according to Fig. 6.

Place the front panel in position, carefully dressing the interconnecting leads inside the case. Do not screw the panel down until the following operations have been carried out.

Plug the mains power supply unit into the jack socket SK1. Make up a coaxial lead (television aerial cable) about 6 feet in length with a coaxial plug at one end and a phono plug at the other.

Plug the coaxial lead into socket SK3. Plug the other end of this lead into the television set aerial socket.

Set the television set to a spare channel and tune to channel 36. Diagonal lines will appear on the screen when the correct setting is approached. Carefully adjust the core of L1 until the picture "locks" on the screen. (See photographs.)

When tuning is completed satisfactorily, replace the panel and screw down.

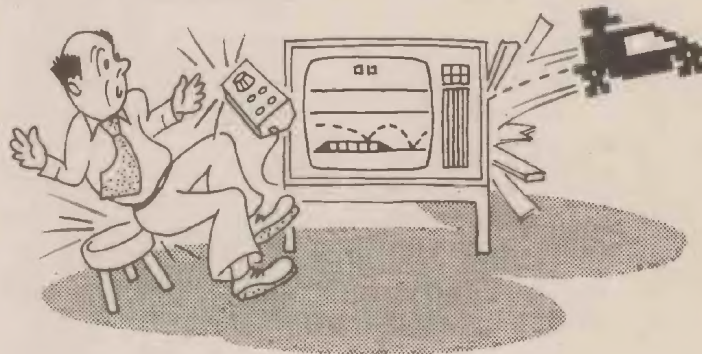
## PLAYING

Set the Throttle Control fully anticlockwise. Select the Amateur (easy) or the Professional (hard)

mode of play. Touch the required game button. The motorcycle (and the game) is activated by advancing the Throttle Control. Details of the four games have been given earlier in this article, together with off-screen photographs illustrating typical displays.

The essence of the game lies in sensitive and anticipatory manipulation of the Throttle Control with simultaneous close observation of the motorcycle's career across the screen. With practice a high order of skill can be developed. The ultimate is reached when 36 buses have been jumped. With this achievement the screen becomes filled with buses.

Although essentially a test of an individual's skill, the Stunt Cycle can, of course, be played in a competitive way with other participants, each playing in turn and recording their individual performances. ✧



Readers' Bright Ideas; any idea that is published will be awarded payment according to its merit. The ideas have not been proved by us.

you remove the soldering iron insert a sharpened matchstick. The matchstick does not attract solder, and is easily withdrawn after the solder has hardened leaving a nice clear hole.

J. A. Noble, Huddersfield.

## USING I.C.S.

It is generally agreed that an integrated circuit should be the last item to be fixed to a strip board module, but its absence from the board does not make component fitting and soldering too easy. I use a nylon-pointed pen to mark the d.i.l. holes. Just twist the pen-point into each appropriate hole. Also use the pen-point in the same way to indicate the position of any cut made in the copper strip.

When the module is complete, the entire circuit can be "read" from the front of the board, or checked against a wiring diagram.

When using 0.1 matrix stripboard, which is dark brown in colour, slightly countersink the top surface of the hole where a cut has been made in the copper strip. With the cuts clearly indicated, again it is a simple matter to "read" the circuit without reference to the back of the board.

C. R. Emmans,  
Allestree,  
Derby

## DESOLDERING

I read the letter from J. R. Hunt in the November 1977 issue of E.E. about clearing solder from holes in circuit boards (for replacement of components) and thought readers might be interested in my method.

After the component has been removed simply remelt the solder around the hole to be cleared and as



## TV GAMES

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## COMPONENTS

Plastic versions of BC108/9 5p. 2N3055B 37p. 1N4148 21p. 1N4002 5p. Resistors 5% carbon £12 10 to 10M. 1W 0.95p. 1W 2p. Preset pots sub-miniature 0-1W horiz. or vert. 100 to 4M7 51p. Potentiometers 1W 4K7 to 2M2 log or lin. single 25p. Dual 75p. Polyester capacitors 250V E6 .01 to .068mf 31p. 0-1mf 2p. .15mf 5p. .22mf 5p. .33, .47mf 5p. Polyester capacitors £12 63V 220pf to 8200pf 31p. Ceramic capacitors 50V E6 22pf to 4700pf 3p. Mylar capacitors 100V .001, .002, .005mf 4p. .01, .02mf 41p. .04, .05 51p. Electrolytics 50V 47, 1, 2mf 5p. 25V 5mf 5p. 10mf 4p. 16V 22mf 5p. 33, 47, 100mf 6p. 220, 330 mf 9p. 470mf 11p. 1000mf 81p. Zeners 400mW E24 2V7 to 33V 71p.

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## PRINTED CIRCUIT MATERIALS

PC etching kits — economy £1.70. standard £3.82. 50 sq. ins. pcb 40p. 1 lb FeCl £1.05. Etch resist pens — economy 45p. dale 75p. Small drill bit 20p. Etching dish, 68p. Laminator cutter 75p.

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Prices shown are for kits of on board mounted components including potentiometers but excluding hardware and transformers. Send s.a.e. for full details naming kit. All prices below include VAT. P & P 30p.

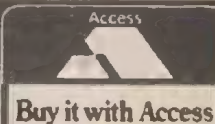
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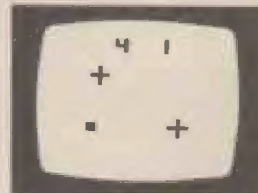
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